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published in
Behaviour Research and Therapy
2014

DOI (link to publisher)
10.1016/j.brat.2014.09.006

document version
Publisher's PDF, also known as Version of record

Behaviour Research and Therapy 63 (2014) 55–62

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

The impact of comorbid depression on recovery from personality disorders and improvements in psychosocial functioning: Results from a randomized controlled trial

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ARTICLE INFO

Article history:
Received 4 April 2014
Received in revised form
3 September 2014
Accepted 15 September 2014
Available online 23 September 2014

Keywords:
Personality disorders
Schema therapy
Randomized clinical trial
Depression

ABSTRACT

Depressive disorders often co-occur with personality disorders. The extent to which depressive disorders influence treatment outcome in personality disorders remains unclear. The aim of this study was to determine the impact of co-morbid depression on recovery from personality disorders and improvements in psychosocial functioning. This study drew data from a randomized-controlled trial in which patients ($N = 320$) with cluster-c (92%), paranoid, histrionic and/or narcissistic personality disorders received schema-therapy, treatment-as-usual, or clarification-oriented psychotherapy. Recovery from personality disorders at three-year follow-up and improvements in psychosocial functioning over a course of three years was predicted by the diagnostic status of depressive disorders at baseline using mixed model regression analyses. Based on the number of axis-I and axis-II disorders, personality disorder severity and global symptomatic distress and functioning a baseline severity index was computed and included in subsequent analyses to test the specificity of baseline depression in predicting outcomes. Patients with co-occurring depression reported higher baseline severity compared to patients without co-occurring depression. Depression at baseline was associated with lower recovery rates at three-year follow-up ($p = 0.01$) but this effect disappeared after controlling for baseline severity. Patients with depression at baseline reported higher psychosocial impairments throughout treatment ($p < 0.001$). Depression at baseline did not moderate treatment effects except for one psychosocial outcome measure. In conclusion, depression is associated with lower recovery rates from personality disorders but this effect disappears when general severity is taken into account. Patients with primarily cluster-c personality disorders and co-occurring depression might benefit from additional depression treatment in terms of improved psychosocial functioning.

Introduction

Personality disorders and depressive disorders often co-occur. Results from the Collaborative Longitudinal Personality Disorders Study (CLPS; Gunderson et al., 2000) suggest that about 60% of patients with a personality disorder also have a current depressive disorder (Skodol et al., 1999). This high comorbidity can have important treatment implications. Depressive disorders among patients with personality disorders might interfere with recovery from personality disorders and psychosocial adjustments during treatment. Most previous research on the association between depressive and personality disorders has focused on the impact of personality disorders on recovery of depression (e.g. Newton-Howes, Tyrer, & Johnson, 2006; Newton-Howes et al., 2014) rather than on the impact of comorbid depression on recovery of personality disorders.

Three previous studies drew data from a naturalistic cohort study, the CLPS (Gunderson et al., 2000), to study the relation between depression and personality disorder outcomes. Shea et al.

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http://dx.doi.org/10.1016/j.brat.2014.09.006
0005-7967/

found that remission from depression was related to higher chances of remission from borderline personality disorder at two-year follow-up (Shea et al., 2004). Hellerstein et al. (2010) found that personality disorder patients with comorbid dysthymic disorder had a higher chance to still meet criteria of a personality disorder and had worse psychosocial functioning at a two-year follow up assessment. Finally, Gunderson et al. (2004) found no evidence that the presence of major depressive disorder was associated with remission of borderline personality disorder at three-year follow-up. Another prospective longitudinal study found that borderline personality disorder patients who did not meet criteria for a mood disorder had higher chances to reach remission during one of the follow-up assessments at 2, 4, or 6-years (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2004).

In these naturalistic cohort studies it remains unclear how depression is related to treatment outcome for personality disorders as the potential influence of depression on treatment allocation is not controlled for. The types and adequacy of received treatments remains unclear and patient cohort studies are potentially confounded by indication: personality disorder patients with comorbid depression participating in a cohort study might receive qualitatively and quantitatively different treatments than patients without comorbid depression. The effects of depression on outcome in personality disorders should therefore be studied in randomized controlled trials (RCT) where patients are randomized to treatment conditions regardless of depression comorbidity. Therefore, the aim of this study was to determine the impact of comorbid depression on recovery from personality disorders and improvements in psychosocial functioning in patients with personality disorders participating in an RCT (Bamelis, Evers, & Arntz, 2012). To the best of our knowledge, the current study is the first to determine the impact of comorbid depression on outcome in the treatment of personality disorders in an RCT. We hypothesized that the presence of a diagnosis of a current DSM-IV depressive disorder at baseline would predict lower recovery levels and less improvement in psychosocial functioning at 3-year follow-up.

Methods

The present study is based on data from a multi-centre randomized controlled trial on the (cost-)effectiveness of schema therapy for personality disorders. A more detailed description of the design, methods, and interventions of this study is available elsewhere (Bamelis et al., 2012). In this study 323 patients with a primary diagnosis of a DSM-IV cluster-c (92%), histrionic, narcissistic or paranoid personality disorder were randomized to a 50 session protocol of schema therapy (n = 147; Arntz, 2012), treatment-as-usual (n = 135), or clarification-oriented psychotherapy (n = 41; Sachse, 2001). The reason for the exclusion of other personality disorders was that they were assumed to require lengthier and highly specialized treatment protocols. Inclusion criteria for participation in the study were a diagnosis of at least one DSM-IV personality disorder, as assessed with the Structured Clinical interview for DSM-IV Axis II personality disorders (SCID-II) (First, Spitzer, Gibbon, & Williams, 1994); age between 18 and 65 years. Patients were excluded if they met full or sub-threshold criteria of antisocial, schizotypal, schizoid or borderline personality disorder; had a present or lifetime diagnosis of psychosis or bipolar disorder; had an IQ below 80; had acute suicide risk or reported substance abuse that required detoxification. Of the 323 patients who were randomized, 2 moved away during the randomization period and one withdrew consent so that the final analyses sample is based on 320 patients. Table 1 provides an overview of basic demographic characteristics of the sample and the specific personality disorder diagnoses.

Table 1
Demographic and clinical characteristics of patients with co-occurring depression and patients without co-occurring depression at baseline.

	Depression (n = 141)	No depression (n = 179)	t-test (p-value)	$\chi 2$ (p-value)
Gender, n (%)			–	0.650
Female	82 (58.2)	99 (55.3)		
Male	59 (41.8%)	80 (44.7)		
Age (years), M (SD)	37.62 (9.36)	38.27 (9.82)	0.545	–
Personality disorder diagnosis, n (%)				
Avoidant	99 (70.2)	107 (59.8)	–	0.06
Obsessive-compulsive	51 (36.2)	71 (39.7)	–	0.523
Depressive	52 (36.9)	41 (22.9)	–	0.006
Dependent	25 (17.7)	25 (14)	–	0.357
Paranoid	6 (4.3)	4 (2.2)	–	0.302
Narcissistic	8 (5.7)	9 (5)	–	0.798
Passive-aggressive	6 (4.3)	4 (2.2)	–	0.302
Histrionic	0	2 (1.1)	–	0.208

Measures

The primary outcome measure in the current study was recovery from personality disorders, as assessed by blinded independent interviewers with the SCID-II interview at three-year follow-up. Recovery was defined as not meeting diagnostic criteria of any personality disorder. The inter-rater reliability for the SCID-II in the current study was good (Intraclass correlation coefficient = 0.84; based on 42 double-rated interviews; Bamelis, Evers, Spinhoven, & Arntz, 2014). Reliability data for the SCID-I mood disorder diagnoses are not available from the present study, but raters from our research group who received the same training attained fair to excellent inter-rater reliability for major depressive disorder (kappa 0.66) and dysthymia (kappa 0.81) in a different sample (Lobbestael, Leurgans, & Arntz, 2011). If SCID-II assessments were missing (35.9% missing at follow-up) the personality disorder diagnoses from the last available Assessment of DSM-IV Personality Disorders Questionnaire (ADP-IV; Schotte & Doncker, 1996) were used instead. The ADP-IV is a self-report questionnaire that was assessed at every intermediate and follow-up assessment. Participants indicated along a 7-point Likert scale whether a DSM-IV personality disorder criteria applies to them (1 = not at all; 7 = completely) and the degree of distress they experience from that criteria. These assessments form the ADP-IV traits and ADP-IV distress scales. Adequate psychometric properties have been reported for the ADP-IV (Schotte, De Doncker, Vankerckhoven, Vertommen, & Cosyns, 1998; Schotte et al., 2004).

Assessor based secondary outcomes were global functioning as assessed by the Global Assessment of Functioning Scale (GAF; American Psychiatric Association, 2005) and psychosocial functioning as assessed by the Social and Occupational Functioning Scale (SOFAS; American Psychiatric Association, 2005). Independent assessors rated participants every 6 months on the scales after a semi-structured interview designed to elicit information necessary for the rating. Self-reported psychosocial functioning was assessed using the Work and Social Adjustments Scale (WSAS; Mundt, Marks, Shear, & Greist, 2002).

Axis-I mood disorders at baseline were assessed by research assistants using the Structured Clinical Interview for DSM-IV Axis-I disorders (First, Spitzer, Gibbon, & Williams, 1997). A more detailed description of the instruments used in the study and their psychometric properties is available elsewhere (Bamelis et al., 2012).

Interventions

Schema therapy (ST) is an integrative psychotherapy combining experiential, cognitive-behavioural, psychodynamic and interpersonal techniques (Young, Klosko, & Weishaar, 2003). In the current

study a standardized protocol of (initially) weekly 40 individual sessions ST in year 1 and 10 booster sessions in year 2 was implemented (Arntz, 2012). Clarification-Oriented Psychotherapy (COP) is based on principles from client centred therapy and focuses on interpersonal problems (Sachse, 2001). In the current study weekly individual COP sessions were provided in an open ended fashion. Both ST and COP therapists were trained at the start of the study during a 4-day training, received supervision once a year and weekly peer-supervision. ST therapists were trained in two cohorts, one receiving mainly lectures and video demonstrations and one participating in active role-plays and receiving individual feedback (Bamelis et al., 2012). Treatment-as-usual (TAU) consisted of whatever treatment the local intake staff indicated (except for ST or COP), following the Dutch clinical guidelines for treating patients with personality disorders. All TAU was primarily psychological treatment (21% CBT or EMDR, 32% supportive therapy, 42% insight oriented psychotherapy). Therapists in the TAU condition did not follow a standardized study protocol and did not receive training or supervision for the study but had standard local peer-supervision. The median number of sessions in TAU was 22.

Statistical analyses

All analyses were based on the intention-to-treat principle by including all available data in the analyses. ST therapists trained in the second, more interactive, cohort had better effects than ST therapists trained in the first cohort (Bamelis et al., 2014). We therefore included therapist training cohort effects in all analyses of primary and secondary outcomes, represented by a centred covariate (−0.5 for first, 0.5 for second cohort; 0 for COP (Bamelis et al., 2014)). Depression at baseline was operationalized as the presence (coded 1) or absence (coded 0) of any depressive disorder at baseline (major depressive disorder single episode, recurrent major depressive disorder and/or dysthymia). In all prediction models the effect of baseline depression (and baseline depression × time interactions for continuous outcomes) was of primary interest. The depression × condition (for continuous outcomes the time × depression × condition) interaction was of secondary interest, testing moderation of treatment by depression.

For dichotomous outcomes we used mixed logistic regression analyses with participants nested within clinical sites. The dependent variable in this analysis was recovery of personality disorders at three-year follow-up. Fixed effects included depressive disorder diagnostic status at pre-treatment, treatment condition, cohort as well as the depression × treatment condition and cohort × treatment condition interactions. Non-significant interaction terms were removed from the model in order to estimate main effects. Random effects included random intercepts for the 12 different clinical sites. We computed a baseline severity-index (internal consistency 0.76) based on standardized scores of the number of axis-I disorders (except for current depressive disorders), the number of axis-II disorders, ADP-IV scores, Symptom Checklist-90 total score, Global Assessment of Functioning score and the Social and Occupational Functioning Assessment Score. The severity index is the average of these standardized variables and has a mean of 0. Scores above 0 represent higher baseline severity and scores below 0 represent lower baseline severity. Baseline severity was included as fixed effect in the mixed logistic regression analyses predicting recovery by depressive symptom severity. We computed a separate baseline severity-index for the models predicting change in psychosocial functioning, excluding the Global Assessment of Functioning score and the Social and Occupational Functioning Assessment Score.

For continuous outcomes we used mixed linear regression analyses with repeated assessments nested within participants nested within clinical sites. For repeated measures an unstructured covariance structure was specified. Fixed effects included a general time variable, depressive disorder diagnostic status at baseline, dummy coded (0,1) variables for treatment conditions with treatment-as-usual as reference condition, cohort, the two-way time × treatment condition, time × cohort, and time × depression interactions. Moderation of treatment effects by depression at baseline was modelled by including the time × ST (resp. COP) × depression three-way interactions. Moderation of the superior effects of the second ST cohort by depression at baseline was modelled by including the time × ST × cohort × depression four-way interaction along with the respective lower-order interactions. Random intercepts and random slopes were specified for clinical sites. For all continuous outcomes we calculated the effect-size *r*, based on the multilevel estimates, using the following formula: $r = \mathrm{SQRT}(t^2/(t^2 + \mathrm{df}))$. A more detailed description of the analytical approach for primary and secondary outcomes in the current study as well as a number of sensitivity analyses is provided elsewhere (Bamelis et al., 2014).

Results

Comorbid depression at baseline

Table 2 provides an overview of the distribution of current depressive disorders at baseline across the three treatment conditions. Of the overall sample of 323 patients with a primary personality disorder 44.1% ($n = 141$) also met the criteria of a current depressive disorder at baseline. Patients who met DSM-IV criteria for a depressive disorder not otherwise specified ($n = 2$) were not included in the comorbid depression at baseline group. There were no statistical significant differences in the distribution of depressive disorders at baseline across the three treatment conditions (Chi-square tests; all *p*-values >0.05).

Baseline severity in patients with and without co-occurring depression

To determine whether patients with depression at baseline differed from patients without depression at baseline on the clinical baseline variables from which the severity index was computed, we conducted a number of independent sample *t*-tests. The number of current axis-I and current axis-II disorders were non-normally distributed and therefore compared using a non-parametric test (Mann–Whitney *U* Test). Patients with co-occurring depression at baseline had a higher number of axis-I disorders and axis-II disorders, scored higher on ADP-IV trait and distress scales, had higher SCL-90 total scores and lower functioning on the GAF and SOFAS at baseline (all *p*-values <0.01; Table 3). The correlation between depression at baseline and general severity at baseline was $r = 0.31$, $p < 0.001$.

Table 2
Co-occurrence of depressive disorders across treatment conditions.

	ST ($n = 145$)	COP ($n = 41$)	TAU ($n = 134$)	Overall ($n = 320$)	$\chi 2$ (*p*-value)
Single episode	10 (6.9%)	2 (4.9%)	8 (6%)	20 (6.3%)	0.50
Recurrent	33 (22.8%)	13 (31.7%)	34 (25.4%)	80 (25%)	0.88
Dysthymia	25 (17.2%)	12 (29.3%)	23 (17.2%)	60 (18.9%)	0.18
Any depressive disorder	60 (41.4%)	23 (56.1%)	58 (43.3%)	141 (44.1%)	0.24

Note: ST = Schema Therapy; COP = Clarification-Oriented Psychotherapy; TAU = treatment-as-usual.

Effects of current depression on recovery from personality disorders

First we conducted a mixed logistic regression analyses to predict recovery from personality disorder by current depression at baseline. The interaction between current depression and treatment condition was not significant ($p = 0.51$), indicating that depression at baseline did not moderate the difference between treatment conditions on outcome. After removing the non-significant interaction term from the model there was a significant main effect of current depression on recovery ($p = 0.01$; Table 4). The estimated proportion of recovery for patients without a diagnosis of current depression at baseline was 0.70 whereas the estimated proportion of recovery for patients with a current depression diagnosis at baseline was 0.56.

Given that the two groups also differed on a number of important clinical variables (Table 3) we added general baseline severity to the model to determine whether the effects of baseline depression on recovery can better be accounted for by overall severity. After adding baseline severity to the model the effect of baseline depression was not significant anymore ($p = 0.58$; Table 4). Baseline severity was a significant predictor of recovery ($p < 0.001$), indicating that patients with higher baseline severity had lower recovery rates compared to patients with low baseline severity.

Subgroup analyses

The diagnostic categories for the subgroup analyses reflect patients fulfilling the criteria for a given personality disorder which is not necessarily the primary diagnosis of that patient. The number of patients fulfilling the criteria for an avoidant, obsessive-compulsive, depressive or dependent personality disorder was considered sufficient (i.e. $n > 20$) to allow for additional subgroup analyses within these diagnostic categories. Within each of these PDs the interaction between current depression and treatment condition was not significant and neither was the main effect of depression after deleting the ns interaction (all p-values >0.05). Within the subgroup of patients with any cluster-c PD current depression at baseline was significant ($p = 0.018$), after deleting the ns interaction term. As in the main analyses the effect disappeared after controlling for baseline severity and baseline severity was a significant predictor ($p < 0.001$). Together, this shows that the pattern of findings regarding the relation between depression at baseline and recovery does not differ for patients with avoidant, obsessive-compulsive, depressive or dependent personality disorder. The fact that the relation between depression at baseline and recovery was not-significant within the different diagnostic categories probably reflects a power problem.

Table 3
Means and standard deviations of baseline severity indicators across the two groups.

	Depression ($n = 141$) Mean (SD)	No depression ($n = 179$) Mean (SD)	t(df)	U	p
# Axis-I disorders[a]	1.31 (1.14)	0.96 (1.11)	–	15.16	<0.01
# Axis-II disorders	1.79 (0.83)	1.53 (0.73)	–	14.85	<0.01
ADP4 traits	312.00 (66.03)	283.32 (69.89)	−3.73 (318)	–	<0.001
ADP4 distress	153.56 (29.40)	144.75 (28.47)	−2.71 (318)	–	<0.01
SCL-90	228.40 (57.39)	189.40 (49.52)	−6.52 (318)	–	<0.001
GAF	54.4 (7.91)	57.46 (9.28)	3.12 (318)	–	<0.01
SOFAS	54.01 (9.00)	57.43 (10.20)	3.14 (318)	–	<0.01
Severity index	0.21 (0.57)	−0.16 (0.58)	5.71 (138)	–	<0.001

Note: GAF = Global Assessment of Functioning; SOFAS = Social and Occupational Functioning Scale.
[a] Excluding current depressive disorders.

Table 4
Results of mixed logistic regression analyses predicting recovery by baseline depression before and after controlling for baseline severity.

	Estimate	t	df	p	95% CI (B)
Recovery not controlled for baseline severity					
Baseline depression	−0.63	−2.57	314	0.01	−1.47; −0.11
Recovery controlled for baseline severity					
Baseline depression	−0.15	−0.55	313	0.58	−0.38; 0.68
Baseline severity	−1.13	−4.75	313	<0.001	−1.60; −0.66

Effect of current depression on changes in psychosocial functioning

We used mixed regression analyses to determine the effects of current depression on improvements in psychosocial functioning over the course of treatment. The results of these analyses are summarized in Table 5. First we tested a model including a time × cohort × ST × depression four-way interaction to test whether baseline depression moderated the superior effects of the second schema-therapist cohort on psychosocial adjustments that was found in the main effectiveness analyses (Bamelis et al., 2014). For all three psychosocial functioning measures the four-way interaction was not significant (GAF: $p = 0.95$; SOFAS: $p = 0.84$; WSAS: $p = 0.24$) and therefore removed from the model. After removal, the time × depression × ST and the time × depression × COP three-way interactions were not significant (all p-values >0.05) and therefore removed from the model, starting with the least significant.

After removing the non-significant time × depression × COP interaction in the model predicting change in GAF scores, a significant time × depression × ST interaction emerged, $F(1, 234.82) = 5.20$, $p = 0.02$, $r = 0.15$ (Table 5). Closer inspection of the meaning of this interaction revealed that patients without depression at baseline in the schema therapy condition had more improvements in overall functioning than those in TAU, whereas there was no difference in those with comorbid depression. The time × depression interaction was not significant, but depression predicted lower GAF-scores throughout 3 years (Fig. 1A).

Following these analyses, we added baseline severity as predictor to test whether the effects of baseline depression on global functioning can better be explained by overall symptomatic severity (Table 5). After adding baseline severity to the model, the interaction between time × depression × ST remained significant, $F(1, 237.22) = 4.96$, $p = 0.03$, $r = 0.10$. Baseline severity was a significant predictor of global functioning throughout treatment, $F(1, 287.12) = 39.39$, $p < 0.001$, $r = 0.14$, suggesting that patients with higher severity at baseline reported overall lower levels of global functioning throughout treatment (Fig. 1B). The main effect of depression remained significant, $F(1, 321.12) = 5.75$, $p = 0.02$, $r = 0.13$. The interaction between time and baseline severity was not significant, $F(1, 232.40) = 0.47$, $p = 0.49$, $r = 0.04$, indicating that changes in global functioning throughout treatment did not differ for patients with low versus high levels of baseline severity. Finally, we added the time × baseline severity × ST three-way interaction, along with the respective two-way interactions. The time × baseline severity × ST three-way interaction was not significant, $F(1, 227.64) = 2.03$, $p = 0.16$, $r = 0.09$. After adding this interaction the time × baseline depression × ST interaction became non-significant, $F(1, 232.81) = 3.25$, $p = 0.07$, $r = 0.12$.

In the model predicting change in SOFAS scores, the time × depression interaction was not significant, $F(1, 228.55) = 0.04$, $p = 0.85$, $r = 0.01$ and was therefore removed from the model. After removal a significant main effect of depression emerged, $F(1, 293.24) = 11.31$, $p = 0.001$, $r = 0.19$, indicating that patients with current depression at baseline reported lower SOFAS levels throughout treatment (Fig. 1A).

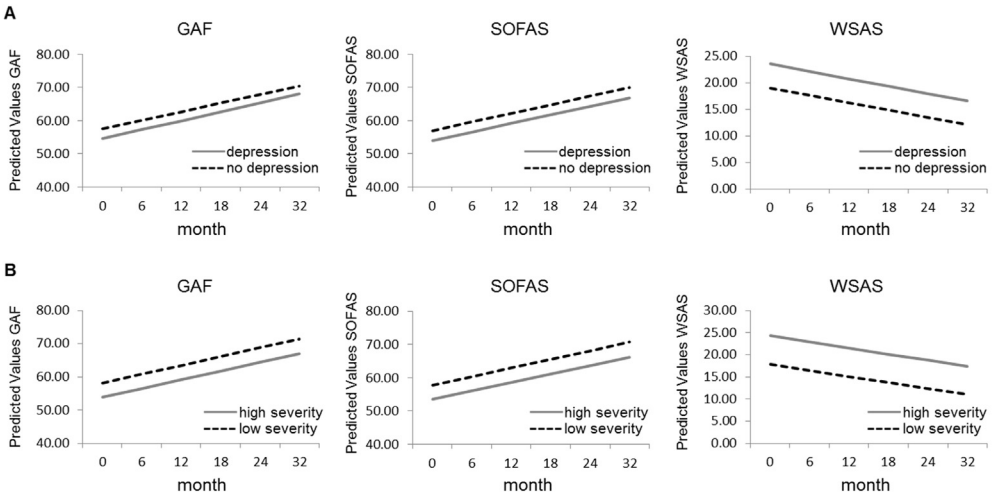
Table 5
Results of mixed regression analyses predicting (change in) psychosocial functioning over time by depressive disorders at baseline.

	Estimate	*t*	*df*	*p*	95% CI (B)	*r*
GAF: not controlled for baseline severity						
Time	1.82	4.25	38.71	<0.001	0.95; 2.69	0.56
Depression	−4.54	−3.33	319.86	<0.01	−7.21; −1.86	0.18
Time × Depression	0.75	1.68	238.00	0.09	−1.29; 1.64	0.11
Time × Depression × ST	−1.48	−2.28	234.82	0.02	−2.75; −0.20	0.15
GAF: controlled for baseline severity						
Time	1.85	4.33	38.54	<0.001	0.99; 2.72	0.57
Depression	−3.15	−2.40	321.12	0.02	−5.74; −0.57	0.13
Baseline severity	−3.67	−6.28	287.12	<0.001	−4.82; −2.52	0.35
Time × Depression	0.73	1.63	240.70	0.11	−0.15; 1.60	0.10
Time × Depression × ST	−1.44	−2.23	237.22	0.03	−2.71; −0.17	0.14
SOFAS: not controlled for baseline severity						
Including time × depression interaction						
Time	1.95	4.58	29.78	<0.001	1.08; 2.81	0.64
Depression	−3.15	−3.23	197.15	<0.001	−5.06; −1.23	0.22
Time × Depression	0.06	0.19	228.55	0.85	−0.56; 0.69	0.01
SOFAS: not controlled for baseline severity						
Without ns. time × depression interaction						
Time	1.97	4.83	25.96	<0.001	1.13; 2.81	0.69
Depression	−3.08	−3.36	293.24	<0.01	−4.89; −1.28	0.19
SOFAS: controlled for baseline severity						
Including time × depression interaction						
Time	1.96	4.63	29.73	<0.001	1.09; 2.83	0.65
Depression	−1.75	−1.80	301.54	0.07	−3.67; 0.16	0.10
Baseline severity	−3.53	−5.44	291.37	<0.001	−4.81; −2.25	0.30
Time × Depression	0.06	0.18	230.55	0.85	−0.57; 0.68	0.01
SOFAS: controlled for baseline severity						
Without ns. time × depression interaction						
Time	1.98	4.88	25.91	<0.001	1.15; 2.82	0.69
Depression	−1.69	−1.85	290.08	0.065	−3.59; 0.11	0.11
Baseline severity	−3.53	−5.44	291.37	<0.001	−4.81; −2.56	0.30
WSAS: not controlled for baseline severity						
Including time × depression interaction						
Time	−1.07	−3.71	33.77	<0.01	−1.65; −0.48	0.54
Depression	4.85	5.96	307.86	<0.001	3.25; 6.45	0.32
Time × Depression	−0.32	−1.43	259.74	0.15	−0.77; 0.12	0.09
WSAS: not controlled for baseline severity						
Without ns. time × depression interaction						
Time	−1.20	−4.47	30.41	<0.001	−1.76; −0.65	0.63
Depression	4.48	5.81	306.08	<0.001	2.96; 6.00	0.32
WSAS: controlled for baseline severity						
Including time × depression interaction						
Time	−1.09	−3.80	33.94	<0.01	−1.67; −0.51	0.55
Depression	2.74	3.72	311.92	<0.001	1.29; 4.19	0.21
Baseline severity	5.16	10.38	307.60	<0.001	4.18; 6.13	0.51
Time × Depression	−0.30	−1.32	259.21	0.19	−0.74; 0.15	0.08
WSAS: controlled for baseline severity						
Without ns. time × depression interaction						
Time	−1.21	−4.52	30.44	<0.001	−1.77; −0.67	0.63
Depression	2.45	3.49	305.60	<0.01	1.07; 3.83	0.20
Baseline severity	5.16	10.40	307.50	<0.001	4.18; 6.14	0.51

Note: GAF = Global Assessment of Functioning; SOFAS = Social and Occupational Functioning Scale; WSAS = Work and Social Adjustment Scale. Higher scores on the GAF and SOFAS indicate better functioning. Higher scores on the WSAS indicate worse functioning. Table shows model including higher order two-way interaction terms and in case of non-significant interactions models only including main effects of depression. All models are controlled for cohort.

To determine whether the effect of depression at baseline on social and occupational functioning throughout treatment can better be accounted for by baseline severity we added baseline severity (Table 5). After controlling for baseline severity in the model without the non-significant time × depression interaction, the main effect of depression at baseline became non-significant, $F(1, 290.08) = 3.43$, $p = 0.065$, $r = 0.11$. There was a significant main effect of baseline severity, $F(1, 291.37) = 29.60$, $p < 0.001$, $r = 0.30$, indicating that patients with higher baseline severity reported more impairments in social occupational functioning throughout treatment (Fig. 1B). The interaction between time and baseline severity was not significant, $F(1, 226.88) = 0.11$, $p = 0.74$, $r = 0.02$ indicating that changes in social and occupational functioning did not differ for patients with low and high levels of baseline severity.

In the model predicting change in WSAS scores, the time × depression interaction was not significant, $F(1, 259.74) = 2.05$, $p = 0.15$, $r = 0.09$ and was therefore removed from the model. After removal there was a significant main effect of depression, $F(1, 306.08) = 33.72$, $p < 0.001$, $r = 0.32$, indicating that patients with current depression at baseline reported higher WSAS levels throughout treatment (Fig. 1A). To test whether the effect of depression on self-reported work and social functioning can better be accounted for by general severity, we also added the baseline severity index as predictor (Table 5). After adding baseline severity to the model without the non-significant time × depression interaction, the main effect of depression at baseline remained significant, $F(1, 305.60) = 12.17$, $p < 0.01$, $r = 0.20$. Moreover, there was a significant main effect of baseline severity on work and social adjustments, $F(1, 307.50) = 108.11$, $p < 0.001$, $r = 0.51$ (Fig. 1B). The



Note. GAF=Global Assessment of Functioning; SOFAS=Social and Occupational Functioning Assessment Scale; WSAS=Work and Social Adjustment Scale. Higher scores on the GAF and SOFAS indicated better functioning. Higher scores on the WSAS indicate worse functioning.

Fig. 1. Change in global functioning, social and occupational functioning and work and social adjustment across 32 months by depression at baseline (part A) and by low and high severity (part B). Note: GAF = Global Assessment of Functioning; SOFAS = Social and Occupational Functioning Assessment Scale; WSAS = Work and Social Adjustment Scale. Higher scores on the GAF and SOFAS indicated better functioning. Higher scores on the WSAS indicate worse functioning.

interaction between time and baseline severity was not significant, $F(1, 252.34) = 1.38$, $p = 0.24$, $r = 0.07$, indicating that changes in work and social adjustments did not differ for patients with low and high levels of symptom severity at baseline.

Discussion

The aim of this study was to determine the impact of comorbid depression at baseline on treatment outcome for patients with primarily cluster-c (92%) personality disorders. In the current study about 44% of all patients also met criteria for comorbid depression at baseline. These prevalence rates are slightly lower than those previously reported in a large naturalistic cohort study (Skodol et al., 1999). In the current study, patients with comorbid depression at baseline experienced less recovery from personality disorders at three-year follow-up compared to patients without comorbid depression at baseline and this effect did not differ between treatment conditions. After controlling for general severity at baseline, the impact of comorbid depression at baseline on recovery was not statistically significant anymore.

Our findings suggest that the chances of recovery following treatment for personality disorders for patients with comorbid depression do not differ from those of personality disorder patients without comorbid depression, after controlling for overall severity. Although one might argue that general severity is just another index for depressive symptom severity, it should be noted, that the relation between general severity and depression at baseline was not very large ($r = 0.31$), suggesting that these two variables measured different, though overlapping, constructs. Moreover, we found an adequate internal consistency of the general severity index suggesting that the different variables on which the severity index was based could be meaningfully combined. Another potential issue that could complicate the interpretation of the results from the current study has to do with the potential complexity of diagnosing depressive disorders in patients with personality disorders. However, given that in the current study diagnostic interviews were conducted by trained clinicians it is unlikely that the depressive state coloured personality disorder assessments or vice versa. During the SCID-II interview, the interviewer must carefully determine whether personality disorder symptoms are also present during periods of normal mood.

Overall, these findings differ from those of a previous naturalistic cohort study showing that personality disorder patients with co-morbid dysthymic disorder had lower recovery rates at two-years follow-up compared to patients without comorbid dysthymic disorder (Hellerstein et al., 2010). However, the Hellerstein et al. study did not test whether severity was a stronger predictor, overruling the effects of depression. Our results suggest that not depression per se but rather general severity is a negative predictive factor in the treatment of personality disorders. Higher severity probably means that a larger improvement has to take place to cross the threshold for recovery from personality disorder diagnosis – note that the severity index included number of personality disorders and self-reported personality disorder-pathology. Future studies predicting outcome of personality disorders with depression should take into account general severity.

In the current study patients with primarily cluster-c personality disorders were randomized to treatment protocols, whereas patients in previous cohort studies received treatment in uncontrolled, naturalistic settings. It has been argued that the relation between personality pathology and treatment outcome in depression might be an artefact of the research design, with the less controlled studies generally supporting such a link whereas controlled studies generally do not support the notion that personality disorders have a negative impact on treatment outcome in depression (Mulder, 2002). The same might hold for the impact of depression on outcome in personality disorders. Personality disorder patients with comorbid depression in naturalistic settings might be treated for depressive symptoms instead of the underlying personality pathology and hence report lower remission rates from personality disorders compared to personality disorder patients without comorbid depression. In contrast, patients in the current study were randomized to treatment for personality disorders regardless of their depressive disorder status at baseline. It should be noted, however, that it cannot be ruled out completely that patients with co-occurring depression in the current study were treated differently than patients without co-occurring depression. It is possible that the specific content of the therapy

sessions and therapeutic style differed between patients with depression compared to patients without co-occurring depression.

In the current study personality disorder patients with co-occurring depression differed on a number of important clinical variables (number of axis-I and axis-II disorders, personality disorder traits and distress, general severity, and psychosocial and general functioning) from personality disorder patients without co-occurring depression. The overall severity was a better predictor of recovery than the presence of depressive disorders. Results of previous studies might have differed if these studies had taken these clinically important variables into account when predicting recovery from personality disorders by depression.

We also determined the impact of comorbid depression on psychosocial functioning during three-years and found that patients with comorbid depression at baseline reported worse psychosocial functioning throughout this period, compared to patients who had no comorbid depression at baseline. However, comorbid depression had no impact on the improvements in psychosocial functioning over the course of treatment. These findings suggest that depression among patients with personality disorders does not interfere with improvements in psychosocial functioning during the course of treatment. Yet, the initial worse psychosocial functioning in personality disorder patients with comorbid depression does not catch up with the post treatment functioning of patients without comorbid depression in the treatment of personality disorders, leaving personality disorder patients with depression at an improved but still higher level of psychosocial impairments at post-treatment. After controlling for baseline-severity the effects of depression on psychosocial functioning remained largely stable, suggesting that these effects were not better accounted for by general symptom severity.

In the models predicting change in GAF scores over time there was a statistically significant time × depression × schema therapy interaction, indicating that patients without depression at baseline who were randomized to schema therapy (ST) had more improvements on the GAF compared to patients without depression at baseline who were randomized to TAU. No differences between ST and TAU for improvements in global functioning emerged for those with co-occurring depression. It should be noted, that the effect size of this interaction was small ($r = 0.15$) and this interaction was not-significant for the other psychosocial functioning measures. It therefore remains unclear how robust this finding is. The degree to which personality disorder patients with co-occurring depression or patients with primary depression benefit from ST on global functioning ratings is an issue for future research.

Limitations

First, the current study focused on patients with predominantly cluster-c personality disorders (92%) and it therefore remains unclear how our results would generalize to patients with other personality disorders. For example, depression is also known to frequently co-occur with borderline personality disorder and it is unclear if co-occurring depression has a negative impact on treatment outcomes of borderline personality disorder. Second, we determined the impact of categorical depression diagnoses but did not take dimensional measures of depression into account. One previous study on the impact of personality disorders on treatment outcome in depression suggests that dimensional but not categorical assessments of personality pathology predicts treatment outcome for depression (Levenson, Wallace, Fournier, Rucci, & Frank, 2012). The same might hold for the prediction of recovery from personality disorders by dimensional rather than categorical measures of depressive symptoms.

Clinical implications

Clinically, our findings suggest that the presence of a current depressive disorder does not worsen treatment outcome in patients with primarily cluster-c personality disorders. The chances of recovery for patients with depression upon entering treatment for personality disorders do not differ from those without depression after controlling for general severity. This finding suggests that for personality disorder patients with comorbid depression it is not necessary to treat depressive disorders before treating the personality disorder in order to reach similar remission rates as in personality disorder patients without depression. Our results suggest that the chances for recovery from personality disorders in treatment are worse for patients with greater overall severity upon entering treatment. Finally, personality disorder patients with comorbid depression might start and end treatment with relatively more impairment in psychosocial functioning than personality disorder patients without depression, although they profit from treatment. These patients might benefit from additional treatment of depressive symptoms in terms of improvements in psychosocial functioning.

Declaration of interest

None.

Financial support

This work was supported by the Netherlands Organization for Health Research and Development (ZonMw): Grant number: 945-06-406 (to Arnoud Arntz) and by the Research Institute Experimental Psychopathology, Maastricht University, the Netherlands.

Conflicts of interest

My co-authors and I do not have any potential conflict of interest or had any potential conflict of interest, including any financial, personal, or other relationship with people or organizations during the past three years that might be interpreted as influencing our research.

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